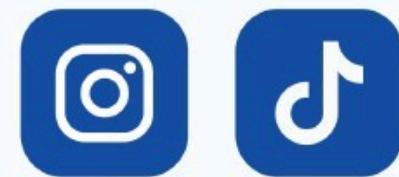




Membangun Sistem Pengenalan Wajah dengan AI Menggunakan Python

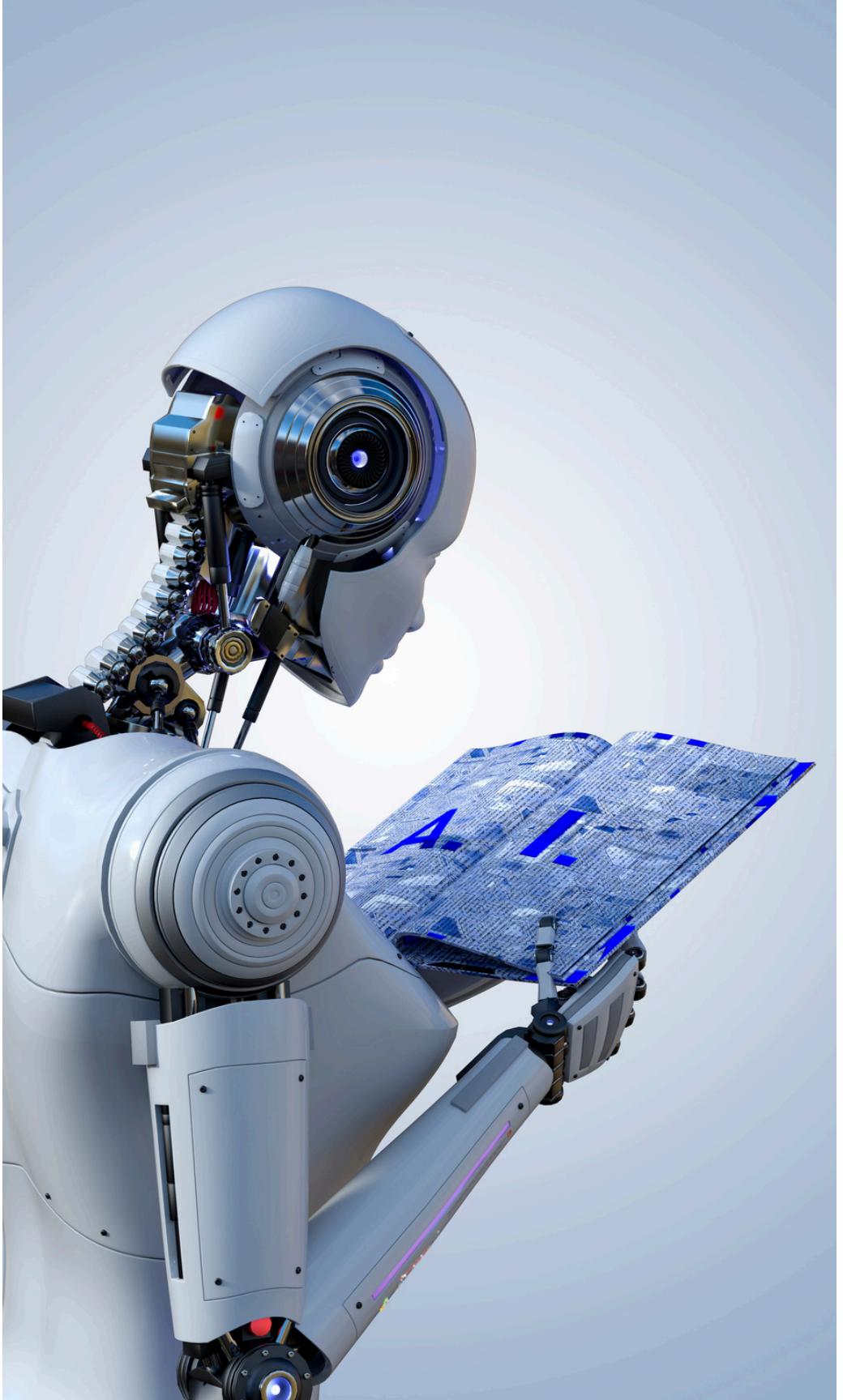
- Okta Irawati, S.Kom., M.Kom.
- Nurhasanah, S.Kom., M.Kom.



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Pendahuluan

1. Apa itu Sistem Pengenalan Wajah?
 - a. Teknologi untuk mendeteksi dan mengenali wajah dalam gambar atau video.
 - b. Aplikasi: keamanan, absensi, personalisasi layanan.
2. Kenapa Python?
 - a. Python memiliki banyak pustaka pendukung seperti OpenCV, dlib, dan TensorFlow.
 - b. Mudah dipelajari dan digunakan untuk implementasi AI.

Agenda Workshop

01

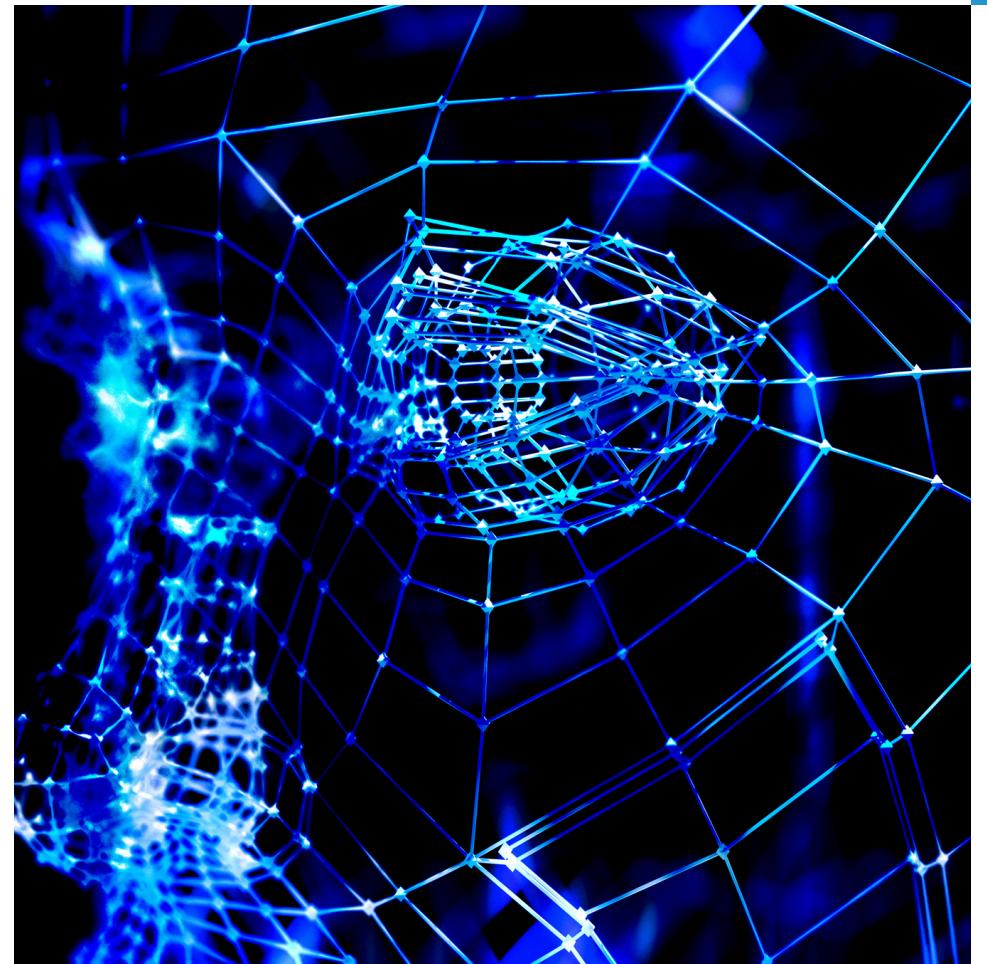
Instalasi dan
Persiapan Tools.

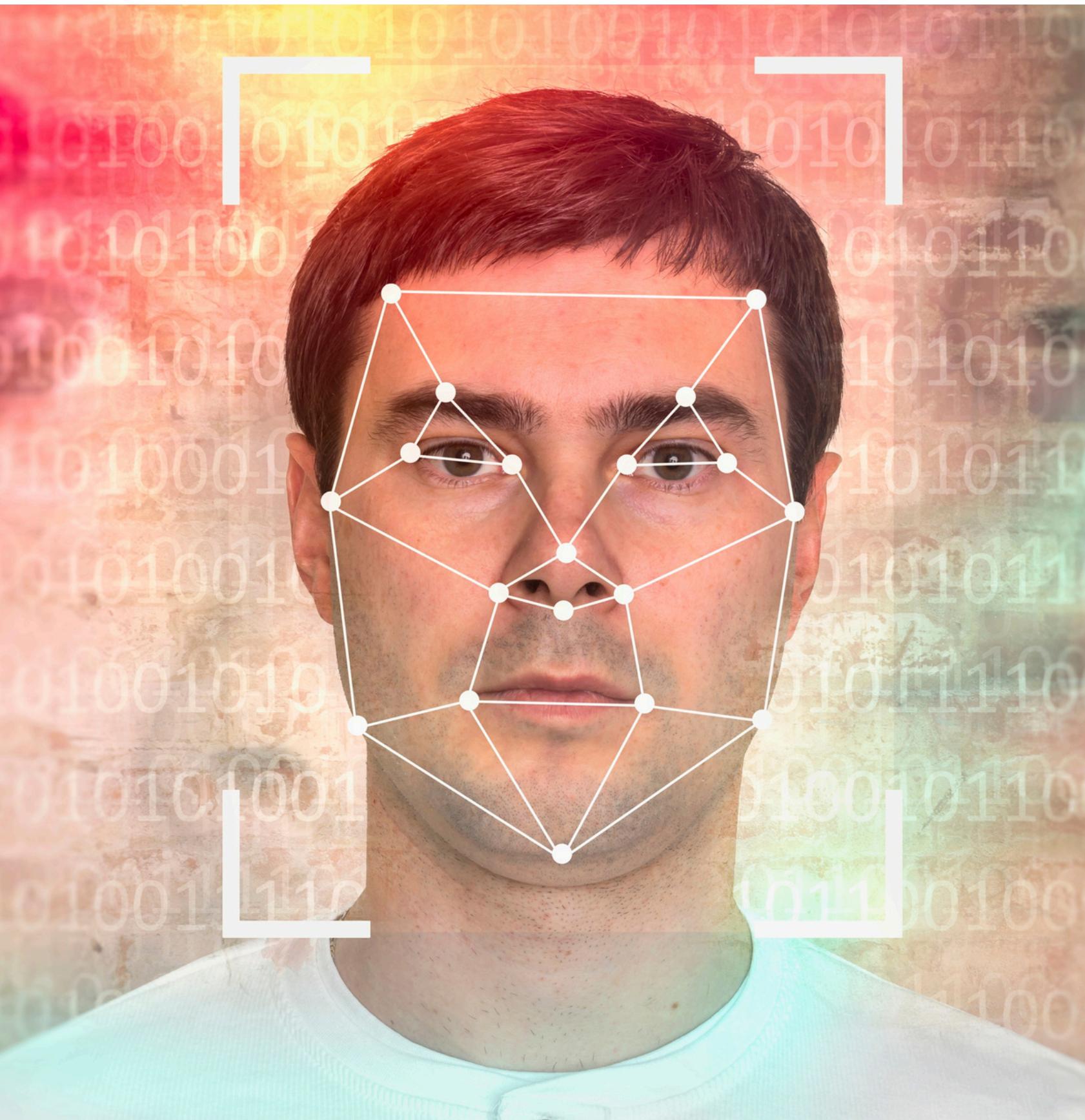
02

Deteksi Wajah
dengan OpenCV.

03

Pengenalan Wajah
menggunakan
Data Set





Instalasi dan Persiapan Tools.

01

Software yang Dibutuhkan:
1. Python (3.8 atau lebih baru).

02

Cara Instalasi:
1. pip install opencv-python
2. pip install opencv-contrib-python
3. pip install pillow

Deteksi Wajah dengan OpenCV

01

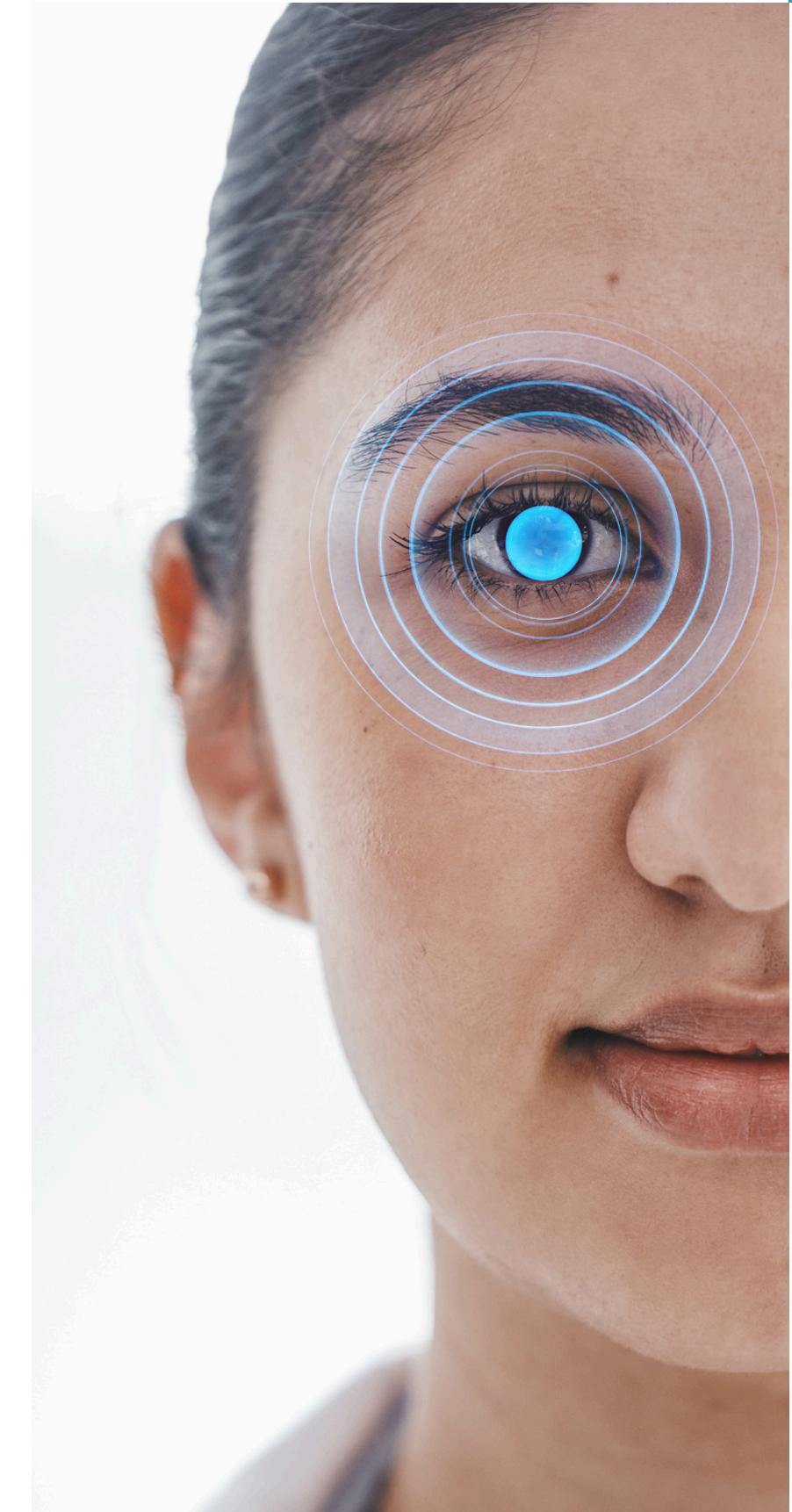
Langkah-Langkah:

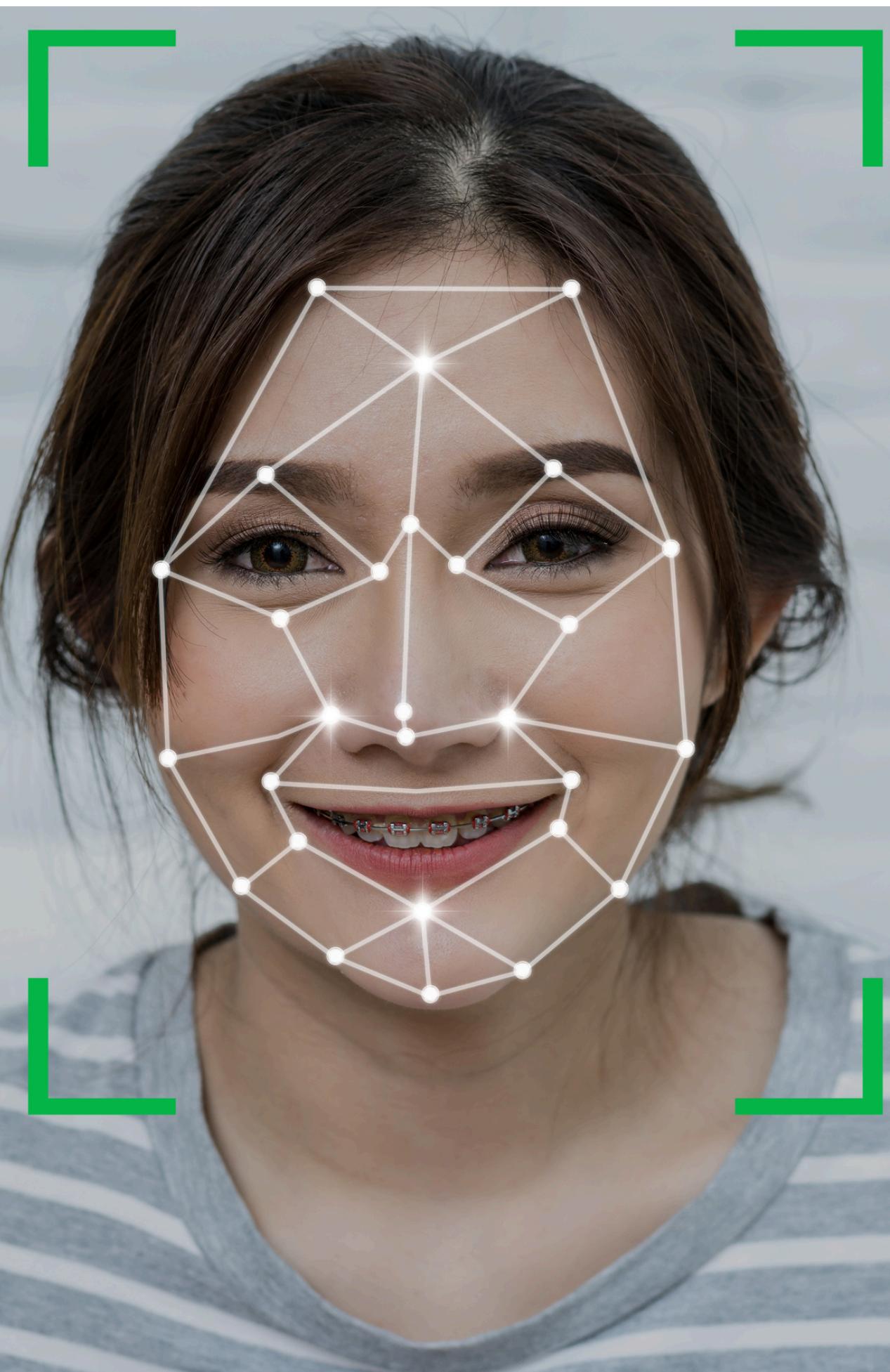
1. Baca gambar dengan OpenCV.
2. Gunakan Haar Cascade untuk deteksi wajah.

02

Contoh Kode:

```
1 import cv2, time
2 camera = 0
3 video = cv2.VideoCapture(camera, cv2.CAP_DSHOW)
4 faceDeteksi = cv2.CascadeClassifier('src\\face.xml')
5 a = 0
6 while True:
7     a = a+1
8     check, frame = video.read()
9     abu = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
10    wajah = faceDeteksi.detectMultiScale(abu,1.3,5)
11    for (x,y,w,h) in wajah:
12        cv2.rectangle(frame,(x,y),(x+w,y+h),(0,255,0),2)
13        cv2.imshow("Face Recognition", frame)
14        key = cv2.waitKey(1)
15        if key == ord("q"):
16            break
17    video.release()
18    cv2.destroyAllWindows()
```





Pengenalan Wajah menggunakan Data Set

01

Gunakan Data Set

Gunakan Data Set dengan cara merekam wajah dan menjadikannya data training.

02

Contoh Kode:

```
1 import cv2, time
2 camera = 0
3 video = cv2.VideoCapture(camera, cv2.CAP_DSHOW)
4 faceDeteksi = cv2.CascadeClassifier('src\\face.xml')
5 id = input ('Masukkan ID : ')
6 a = 0
7 while True:
8     a = a+1
9     check, frame = video.read()
10    abu = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
11    wajah = faceDeteksi.detectMultiScale(abu,1.3,5)
12    for (x,y,w,h) in wajah:
13        cv2.imwrite('DataSet/User.'+str(id)+'. '+str(a)+'.jpg',abu[y:y+h,x:x+w])
14        cv2.rectangle(frame,(x,y),(x+w,y+h),(0,255,0),2)
15        cv2.imshow("Face Recognition", frame)
16    if (a>29):
17        break
18 video.release()
19 cv2.destroyAllWindows()
```

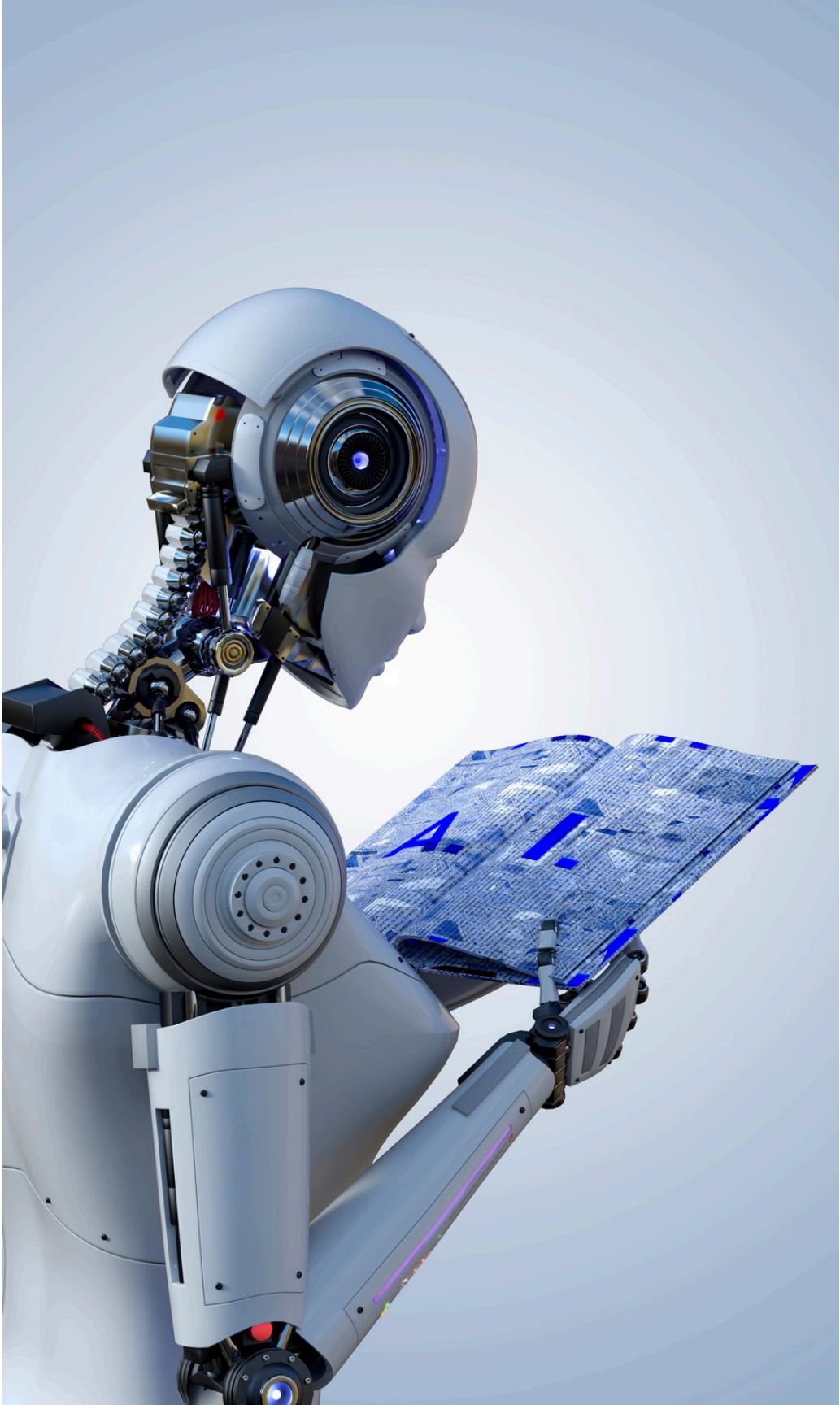


Data Training

```
1 import cv2, os
2 import numpy as np
3 from PIL import Image
4 recognizer = cv2.face.LBPHFaceRecognizer_create()
5 detector = cv2.CascadeClassifier("src\\face.xml");
6 def getImagesWithLabels(path):
7     imagePaths=[os.path.join(path,f) for f in os.listdir(path)]
8     faceSamples=[]
9     Ids=[]
10    for imagePath in imagePaths:
11        pilImage=Image.open(imagePath).convert('L')
12        imageNp=np.array(pilImage, 'uint8')
13        Id=int(os.path.split(imagePath)[-1].split(".")[1])
14        faces=detector.detectMultiScale(imageNp)
15        for (x,y,w,h) in faces:
16            faceSamples.append(imageNp[y:y+h,x:x+w])
17            Ids.append(Id)
18    return faceSamples, Ids
19 faces, Ids = getImagesWithLabels('DataSet')
20 recognizer.train(faces, np.array(Ids))
21 recognizer.save('DataSet/training.xml')
```

Face Recognition

```
1  import cv2, time
2  import os
3  from PIL import Image
4  camera = 0
5  video = cv2.VideoCapture(camera, cv2.CAP_DSHOW)
6  faceDeteksi = cv2.CascadeClassifier('src\\face.xml')
7  recognizer = cv2.face.LBPHFaceRecognizer_create()
8  recognizer.read('DataSet/training.xml')
9  a = 0
10 while True:
11     a = a+1
12     check, frame = video.read()
13     abu = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
14     wajah = faceDeteksi.detectMultiScale(abu,1.3,5)
15     for (x,y,w,h) in wajah:
16         cv2.rectangle(frame,(x,y),(x+w,y+h),(0,255,0),2)
17         id, conf = recognizer.predict(abu[y:y+h,x:x+w])
18     if(id==1):
19         id='Nur'
20     elif(id==2):
21         id='Okta'
22         cv2.putText(frame, str(id), (x+40,y-10), cv2.FONT_HERSHEY_DUPLEX,1,(0,255,0))
23         cv2.imshow("Face Recognition", frame)
24         key = cv2.waitKey(1)
25     if key == ord("q"):
26         break
27     video.release()
28     cv2.destroyAllWindows()
```



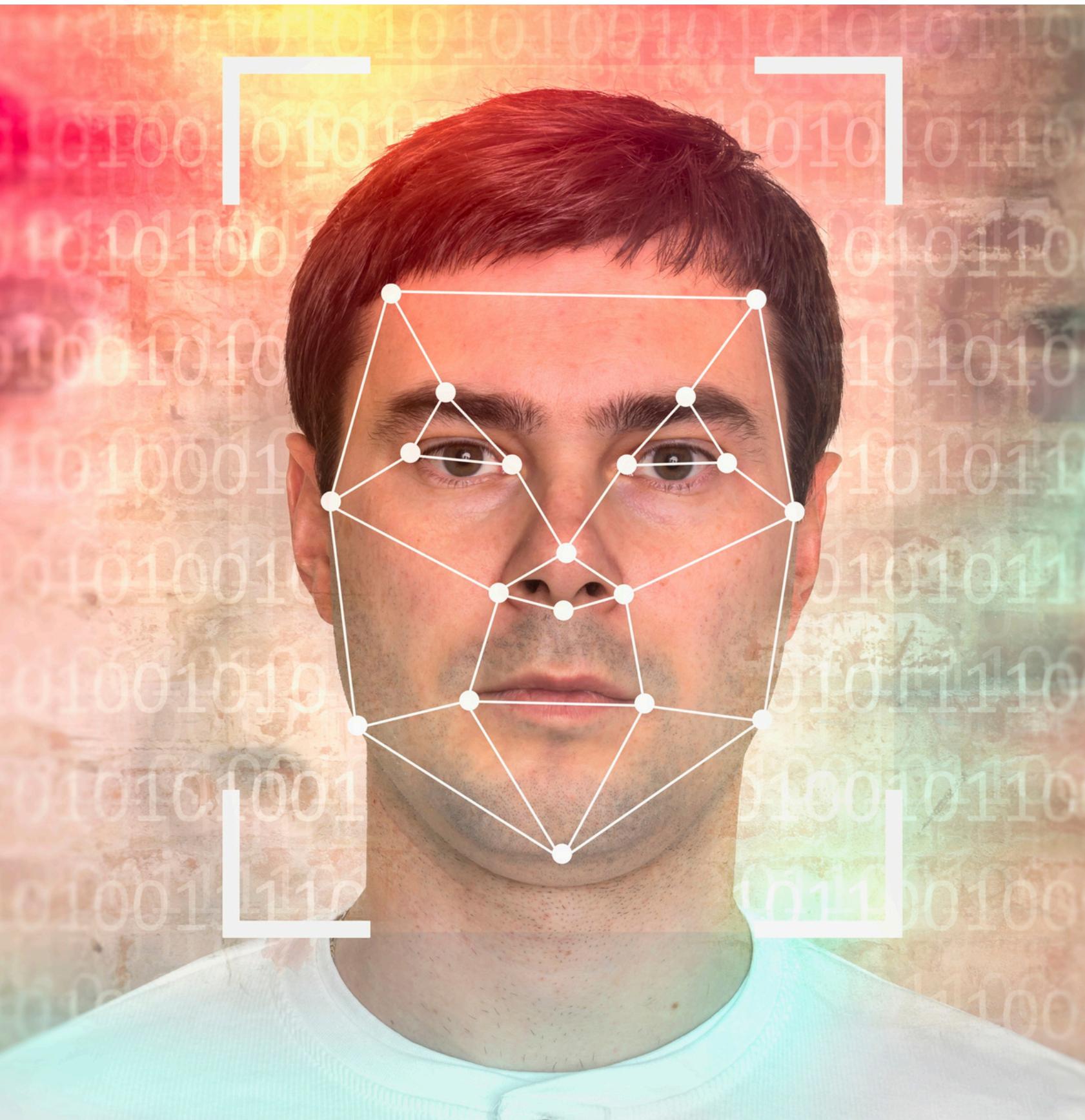
Tantangan dan Solusi

Tantangan:

1. Data training terbatas.
2. Pencahayaan dan sudut wajah.
3. Kecepatan pengolahan pada hardware terbatas.

Solusi:

1. Gunakan dataset besar (LFW, MS-Celeb-1M).
2. Augmentasi data.
3. Gunakan GPU untuk proses lebih cepat.



Penutup

Kesimpulan:

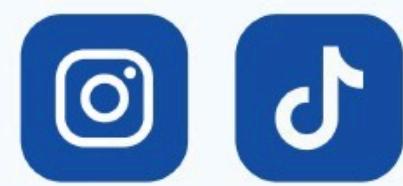
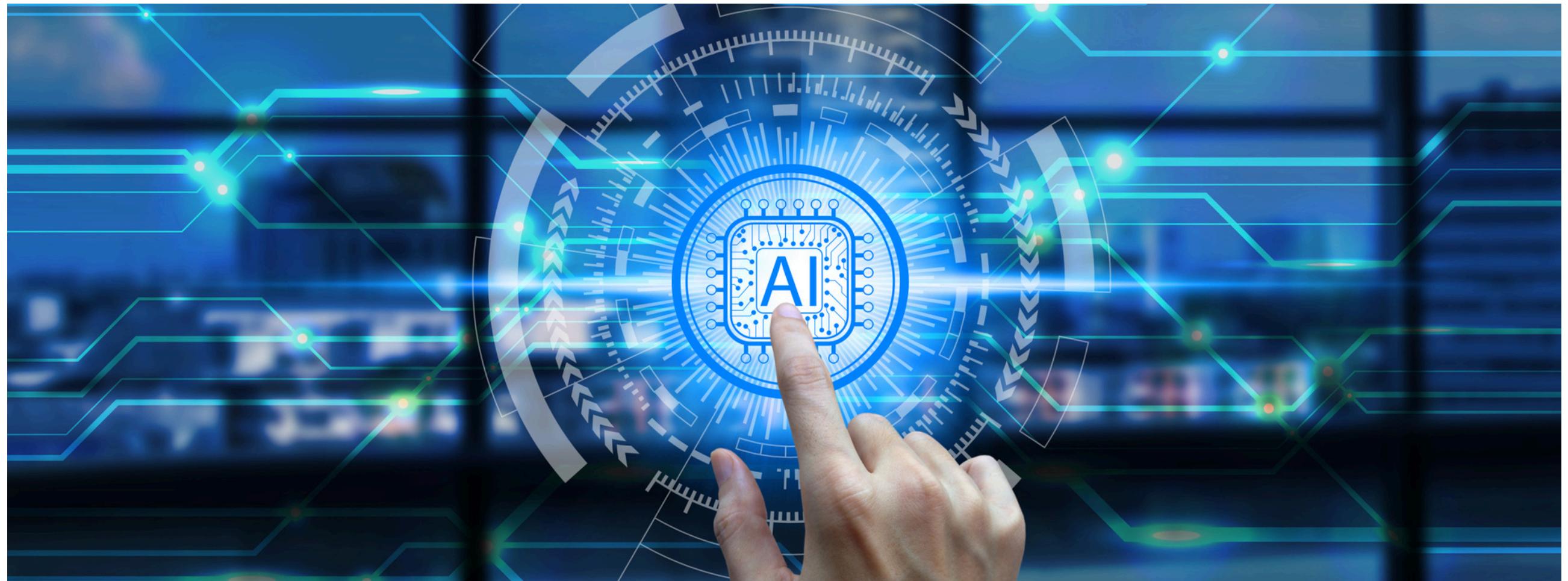
1. Sistem pengenalan wajah menggunakan Python sangat fleksibel.
2. Banyak aplikasi potensial di berbagai bidang.

Langkah Selanjutnya:

1. Eksplorasi model deep learning.
2. Membuat aplikasi berbasis web atau mobile.

Thank You

Source Code



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